Vulcan Wireless LLC Response to December 9, 2011 *Ex Parte* Filing from AT&T

CORRECTING THE LATEST UNSUBSTANTIATED AT&T CLAIMS: There Are No Technical or Cost Impediments to Reconsolidating the Lower 700 MHz Band Classes

Unsubstantiated Claim #1: *Accommodating a reconsolidated Lower 700 MHz band class would "degrade service quality" and impose "substantial disruption and delay to our current LTE deployment plans and significant additional costs"*

Fact: As discussed below, a unified Lower 700 MHz band class can be achieved rapidly and at minimal cost through the existing process of regularly scheduled remote software upgrades, without service disruptions, delays, or degradation.

Unsubstantiated Claim #2: *AT&T would need to "work with our vendors to develop and obtain new chipsets, devices, and radio equipment, a process that usually takes years to complete."*

Fact: Given the lack of interference concerns, the device design modifications are minor and should take on the order of a few months. 3GPP Band Class 12 is an existing band with approved technical specifications. New device chipsets are not necessary. By widening the duplexer to support the Lower A, B and C Blocks, the existing device architecture is unchanged – there is no increase in the number of bands supported, and no new power amplifiers, switches, or filters to incorporate. Only the duplexer needs to be changed (to a component that includes the Lower A Block).

The device software would be upgraded to Band Class 12 (a relatively simple change because it is an existing 3GPP band). If requested by a large customer, Band Class 12 software could be made readily available on new devices in a relatively short period of time.

In addition, legacy LTE devices have software update and upgrade capabilities. As an example, one of the first AT&T devices possessing LTE capabilities was actually upgraded to LTE post-sale through a software update.[1] Other 4G devices offer similar software update processes.[2] A similar approach could be followed for the Band Class 12 upgrade to legacy LTE devices.

Device software upgrades in the 4G era are commonplace, and sophisticated mechanisms are available for managing the process. For instance, Alcatel Lucent's Motive Mobile Device Manager software provides

[1] http://reviews.cnet.com/modems/lg-usbconnect-adrenaline-at/4505-3004_7-34192067.html

("The Adrenaline, which is made by LG, will be the first LTE-upgradeable device. A software update will be made available for the USB modem when AT&T rolls out LTE in mid-2011.").

[2] *See, e.g.*, http://support.verizonwireless.com/pdf/system_update/uml290.pdf Verizon Wireless Pantech UML290 (4G modem software update notice); http://gadgetian.com/24423/samsung-galaxy-tab-10-1-lte-software-update-i905-eh04/ ("[T]he carrier is now pushing out a firmware update… you should expect a few bug fixes including the fix for 4G LTE connectivity issue.").

automated management of firmware and software upgrades for a range of devices and wireless technologies.[3]

The legacy AT&T Band Class 17 devices would be upgraded to recognize Band Class 12 base stations and channel numbers. Although the duplexer in those devices would still only pass the Lower B and C Blocks, the devices may be configured for proper operation.

New Band Class 12 devices would fully support the Lower A, B and C Blocks.

Unsubstantiated Claim #3: *We would have to "complete an upgrade at each of our LTE base stations."*

Fact: AT&T would not need to engage in any base station hardware modifications to begin using Band Class 12. For base stations operating on Band Class 17, AT&T would only need to perform a software upgrade that can be done at minimal or no expense as part of a regularly scheduled maintenance servicing.

Transitioning AT&T's base stations to Band Class 12 would be a straightforward process. No changes to base station hardware would be required. AT&T's base stations are currently configured to operate in the Lower B and/or C Blocks. Post-transition to Band Class 12, AT&T's base stations would still operate in the Lower B and/or C Blocks. No hardware changes are required because AT&T is not changing their operating frequencies. Therefore, AT&T would incur no hardware costs associated with switching to the unified band class.

Wireless operators routinely load new software releases in their base stations, typically twice per year. The software load provides new features and capabilities and fixes any bugs found in prior software releases. The Band Class 12 software could be bundled into one of these regularly delivered software loads and distributed to the eNode Bs via the remote software download feature, in the maintenance window. Converting AT&T's Band Class 17 eNode Bs to Band Class 12, therefore, would likely incur no costs and would require no additional effort beyond that taken in the course of normal operations.

Ericsson and Alcatel-Lucent are the two RAN vendors delivering eNode B equipment to both AT&T and Verizon Wireless. Both vendors should already be developing 3GPP Band Class 12 software to serve Verizon Wireless, given the impending construction deadline for their Lower 700 MHz A Block licenses. Therefore, the vendors would not incur any non-recurring expenses (NRE) for developing the Band Class 12 base station software load for AT&T because of their existing efforts for Verizon Wireless. In fact, costs for the vendors (and therefore for the operators) would likely be ***reduced*** if AT&T were to switch to a Band Class 12 network. Vendors typically incur software validation and quality assurance testing on each software load delivered to a customer. By unifying and reconsolidating the Lower 700 MHz band classes to Band Class 12, the vendors could incur half of the software testing costs relative to their current path. Thus, reconsolidation to Band Class 12 could save money for both the vendors and the operators.

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[3] http://www.alcatel-lucent.com/wps/portal/!ut/p/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLd4w3dnTRL8h2VAQADYR9IA!!?LMSG_CABINET=Solution_Product_Catalog&LMSG_CONTENT_FILE=Products/Product_Detail_001097.xml#tabAnchor3 (The Motive software's "One–to-many management capabilities enable operations personnel to perform large scale actions such as firmware upgrades and configuration updates to targeted populations.").

Unsubstantiated Claim #4: *The addition of a Band Class 12 chipset to our devices would make the devices substantially larger, likely shorten battery life, and potentially require other tradeoffs such as the elimination of a band used for international roaming.*

Fact: Chipsets are not an issue – Band Class 12 would replace Band Class 17 in the devices. Thus, unifying the Lower 700 MHz band classes would have no impact on the size, power consumption, or cost of the devices. Nor would it require the support of multiple 700 MHz bands in the same device.

The only hardware change required is to change the Band Class 17 duplexer to a Band Class 12 duplexer in the new devices. As mentioned above, no new chipsets, switches, power amplifiers, filters, antennas, or other components are required to support Band Class 12 – only the duplexer needs to be changed in the new devices. According to Qualcomm, its chips can support up to five frequency bands – two below 1 GHz and three above 1 GHz. By supporting Band Class 12 instead of Band Class 17, only one low frequency band is used for 700 MHz, leaving one low-frequency band for cellular. New chipsets would need to be developed, however, to support Band Class 12, plus a cellular band, plus the Lower 700 MHz D and E Block spectrum in one device (*e.g.*, if AT&T were to pair the Qualcomm spectrum with other Lower 700 MHz spectrum). This statement similarly applies to the current Band Class 17 situation – new chipsets are required to support Band Class 17, plus a cellular band, plus Lower 700 MHz D and E Block spectrum in one device.

Qualcomm has also stated that it is "actively exploring technically whether it can develop a chip that would support the two Lower 700 MHz band classes plus the cellular band, although it does not have such a solution today." This is precisely why a condition to unify and reconsolidate the Lower 700 MHz band classes is necessary. The existence of two band classes in the Lower 700 MHz Band has significantly hampered and, as of today, completely prevented the deployment of LTE networks on the Lower A Block. Since the interference claims have been demonstrated to lack merit, Band Class 17 is not needed. Consolidation to Band Class 12 would permit devices to use the existing chipset designs.

Unsubstantiated Claim #5: *The "greatest expense" would be associated with managing and mitigating the interference from the Channel 51 broadcasters and any high-power Lower E Block broadcasts; the cost of mitigating holes in our network caused by interference challenges "could easily total billions of dollars."*

Fact: The above statement incorrectly assumes that interference from Channel 51 or Lower E Block is a threat. As demonstrated by the lab and field testing conducted by the coalition of Lower 700 MHz A Block licensees, commercial Band Class 12 devices would perform normally in the real-world RF environment. Moreover, AT&T's wildly exaggerated cost statements and interference concerns are unsubstantiated and do not reflect the actual costs associated with modest software upgrades that can be implemented without service disruptions, delays, or degradation.

Channel 51 reverse power amplifier intermodulation was demonstrated in the laboratory to require a DTV signal strength much stronger than what would be encountered in the real world. Even within a few hundred meters of a DTV tower, any IM products generated within the device would fall at or below the device noise floor.

The strongest measured Lower E Block signals were found within a few blocks of the broadcast towers in Atlanta. From the laboratory testing of AT&T 4G devices, these strongest E Block signals are not strong enough to cause interference if the devices had used a Band Class 12 duplexer. The 50 kW power level allocated to the Lower E Block does not pose an interference threat. The intuitive explanation for this observed phenomenon is that the E Block antenna is mounted a few hundred meters above the ground. The signals undergo a higher path loss relative to LTE base station signals mounted at, say, 25 meters above the ground. Because the device must be designed to handle nearby strong LTE signal levels belonging to a different operator, the E Block signals pose no threat whatsoever.

As for the other concerns raised by AT&T, the potential for Channel 51 to cause interference to A Block base stations is not a device filter issue and played no role in defining Band Class 17, as noted by several base station vendors in the 2008 3GPP discussions. This is a deployment issue to be managed by the Lower A Block licensees.

Band Class 12 device interference into TV receivers is a claim that has never been substantiated. The Band Class 17 proponents have submitted no theoretical analysis or test data suggesting that Band Class 12 devices cause interference, nor have they submitted evidence quantifying any benefit provided by a Band Class 17 RF filter in reducing emissions into Channel 51. The 3GPP specification for Band Class 12 device emissions exceeds the FCC guidelines by 10 dB or more. With no evidence suggesting that a problem may exist, this claim should not be taken seriously as a reason for supporting Band Class 17.

As described in Vulcan's prior *ex parte filings* in this proceeding, however, AT&T's D and E Block use presents a much greater interference challenge to Band Class 12 base stations.